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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,910	03/12/2004	Hong-Jyh Li	2004P50029US/1331.135.101	8291

7590 03/27/2007
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EXAMINER

HOANG, QUOC DINH

ART UNIT	PAPER NUMBER
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2818

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/27/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/799,910	Applicant(s) LI ET AL.	
	Examiner Quoc D. Hoang	Art Unit 2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 January 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7-15 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7-15 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Amendment filed on 1/11/2007 has been entered. Claims 1-5, 7-15 and 17 are pending in the application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 7, 9, 10, 14, 15 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Rodder et al., (US Pat No. 6,251,761 hereinafter "Rodder").

Regarding claims 1, 14 and 15 Rodder teaches a transistor comprising;

a substrate (102) including isolation (112) and active regions;

a high-k gate dielectric layer (108) implanted with a species, the high-k material layer proximate the substrate;

a gate electrode (110) proximate the high-k gate dielectric layer; and

a conductive buffer layer (110) implanted with a species between the high-k dielectric layer and the gate electrode (col. 2, line 52 through col. 5 line 2 and Fig. 1).

Noted that the gate electrode (110) comprises a metal layer overlying a layer of TiN, see col. 4, lines 59-62).

Regarding claim 2, Rodder teaches wherein a transistor (100) is formed from the substrate, the high-k material layer, and the gate electrode (Fig. 1).

Regarding claim 3, Rodder teaches a pre-gate material layer (106) between the substrate and the high-k material layer (col. 2, lines 50-55 and Fig. 1).

Regarding claim 4, Rodder teaches wherein the pre-gate material layer comprises SiON (col. 2, lines 50-55 and Fig. 1).

Regarding claim 5, Rodder teaches wherein the pre-gate material layer has a thickness within the range of 2-10 Angstroms (col. 2, lines 50-55 and Fig. 1).

Regarding claim 7, Rodder teaches wherein the buffer layer (110) comprises TiN (col. 4, lines 59-62).

Regarding claim 9, Rodder teaches wherein the species comprises nitrogen or oxygen (col. 2, line 52 through col. 5 line 2 and Fig. 1).

Regarding claim 10, Rodder teaches wherein the high-k material layer comprises one of Ta₂O₅ (col. 3, lines 55-60).

Regarding claim 17, Rodder teaches wherein the gate electrode comprises polysilicon (col. 3, line 5).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 8 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rodder et al., (US Pat No. 6,251,761 hereinafter "Rodder").

Regarding claim 8, Rodder teaches wherein the buffer layer has a thickness of about 200 Angstroms (col. 4, line 62), but does not teach the buffer layer has a thickness of within the range of 10 to 200 Angstroms. Although Rodder's thickness of the buffer layer is not the claimed range (10-200 Angstroms), this does not define patentable over Rodder since the thickness is well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

Regarding claims 11-13, Rodder teaches wherein the oxygen-containing high-k material layer (108) has a thickness of about 50-110 Angstroms (col. 2, line 66), but does not teach the high-k material layer has a thickness of within the range of 10 to 200 Angstroms and a dose of implanted species is within the range of 10^{13} - 10^{16} ion/cm². Although Rodder's thickness and implanted dose of the buffer layer is not the claimed range (10-200 Angstroms, 10^{13} - 10^{16} ion/cm²), this does not define patentable over Rodder since the thickness and the species concentration are well known processing variable and the discovery of the optimum or workable range involves only routine skill in the art.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

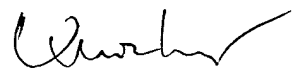
7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quoc Hoang whose telephone number is (571) 272-1780. The examiner can normally be reached on Monday-Friday from 8.00 AM to 5.00 PM.

If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MinSun Harvey can be reached on (571) 272-1835. The fax phone numbers of the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and (571) 273-8300 for After Final communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Quoc Hoang
Patent examiner/AU 2818

QUOC D. HOANG
PRIMARY PATENT EXAMINER


03/20/2007